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Original Research Article

Evaluating the Correlation of Different Culture Media for the Identification and Isolation of Common Gram Positive Uropathogens and Yeast Causing UTI

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ABSTRACT

Background: Urinary tract infection (UTI) is a common problem diagnosed and treated in urgent care medicine practice. Urinary tract infection (UTI) is a collective term that describes any infection involving any part of the urinary tract, namely the kidneys, ureters, bladder and urethra. Clinicians need to be aware of the advantages and limitations of diagnostic tests. Urine cultures occupy most of the workload of routine microbiology laboratories in developing country . Accurate and rapid identification of pathogens is important for a clinical microbiology laboratory. **Materials and Methods:** Mid-stream urine and catheterized samples were collected. Cultures were plated on blood agar, MacConkey agar and cysteine lactose electrolyte deficient media and incubated overnight at 35°C-37°C in ambient air. Colonies on the MacConkey agar, CLED agar and blood agar were also identified. The final identification of the isolates was done using standard identification protocol. **Results:** Out of 500 urine samples processed, 199 showed pure growth .Out of 199 pure growths, 56 were gram positive cocci and 17 were yeast. Out of all gram positive cocci showed growth but most of the gram-positive cocci and yeast were unable to grow on Mac-Conkey agar and blood agar but grew successfully on CLED agar. **Conclusions:** So, in resource constrain laboratories, CLED agar can be used as media of choice for isolation of common uropathogens , cost effective and decreases work load of the laboratories.

INTRODUCTION

Urinary tract infection (UTI) is defined as diseases which are caused by a microbial invasion of genitourinary tract, that spread from renal cortex of kidney to urethral meatus. Responsible for about 25-40% of nosocomial infection1. Urinary tract infections (UTI) represent serious threats to human health all around the world affecting millions of people each year. It is most common among the female population with an incidence of about 1% of school aged girls and 4% of women through child bearing years of age group [2]. It causes diseases in around 150 million people worldwide per year affecting the loss of 6 million USD or more global economy [3]. Most urinary tract infections caused by Candida species are associated with the use of indwelling urinary devices, including Foley catheters, internal stents and percutaneus nephrostomy drains Diabetes are particularly prone to fungal urinary tract infections4. 61% of all urinary tract infections are managed in the primary care setting. It is also common for those episodes to recur [5].

Women are particularly at risk of developing urinary tract infections because of their short urethra & certain behavioral factors which include delay in micturition, sexual activity & the use of diaphragms and spermicides which promote colonization of periurethral area with coliform bacteria [6].

Culturing of urine is commonly and routinely done in microbiology laboratories of developing countries like India. Therefore, they use different culture media for culturing of urine depending upon the resources that are conveniently found. In most of the clinical microbiology laboratories of developing countries, conventionally, they use a media in combination of blood agar & MacConkey agar for culture of urine for long time. [7]

In many laboratories, they started using Cysteine Lactose Electrolyte Deficient (CLED) Agar which is better for detection of urinary pathogens. [8]

A continuous strive by laboratories to streamline & improve urine culture algorithms which are feasible according to their available resources. By remembrining all above points in mind, we planned a study to found that which media is better that can be used for plotting of urine samples and can be able to isolate maximum number of gram positive uropathogens.

As a result, there is continuous strive by the laboratories to streamline and improve urine culture algorithms which are feasible according to their resources available.

By keeping above facts in mind, we had planned a study to found out that which media is better that can be used for plating of urine samples affected by gram positive uropathogens and yeast and can be able to isolate maximum number of pathogens.

MATERIALS AND METHODS

A prospective study of six months duration was conducted on 500 urine samples collected from patients with suspected UTI from out patients of hospital's department as well as in patient department of tertiary care hospital of north India after taking permission from institutional ethical committee.

The samples were mid stream urine and some are catheterized patients also. Specimens were received in microbiology department and being processed as fast as possible [9]

Routine urine samples were cultured by using calibrated loop that delivers 0.001 ml of urine on blood agar, MacConkey agar and Cysteine Lactose Electrolyte deficient media. Cultures were incubated for 24 hours at 35-37°C.

Colonies were identified by indentifying their colony characteristics by uropathogens on Blood agar, MacConkey's agar and CLED agar. Final results were obtained by identification by using their standard identification protocol and their other apposite biochemical [9-11].

RESULTS

Out of 500 urine samples processed, 211 samples showed significant growth, 24 samples showed polymicrobial growth and 265 samples were reported sterile.

All culture results after 24 hours of incubation. Out of these 211 samples showed significant growth 56 were Gram positive cocci and 17 were yeast. Among 56 Gram positive bacteria isolated, most common was *Enterococcus* species 25 (*Enterococcus faecalis* is 23 and *Enterococcus faecium* followed by *Staphylococcus aureus* 24, *Staphylococcus saprophyticus* 5 and *Staphylococcus epidermiditis* from 2 cases that was too from young females of age group 15-25 years. Among yeast isolates all the 17 cases showed *Candida* species (12 were *Candida albicans* and 4 non albicans Candida).

Culture of 500 urine samples on three different media simultaneously i.e. on CLED agar, MacConkey agar, blood agar, the rate of isolation of Gram positive cocci and yeast which are shown in Table 1. Same results were observed in mixed culture growth of gram negative bacilli and gram-positive cocci grown together i.e. all the Gram-negative bacilli grown on all the media but most of the Gram-positive cocci were unable to grow on Mac-Conkey agar and blood agar but grew successfully on CLED agar.

DISCUSSION

Urinary tract infections have been described since ancient times. Urinary tract infections (UTI) represent serious threats to human health all around the world affecting millions of people each year [15-17].

UTI is the most common acute infection which occurs in females. Females are more frequently affected by UTI (particularly cystitis) due to

colonization of urethra by colonic Gram-negative bacilli, close proximity of urethra to anus, short length of urethra (about 4cm) and during sexual intercourse bacteria may introduced into the bladder. Three quarter of UTI occur in pregnant women and one and quarter in non-pregnant women [15-17].

Our study was conducted for comparative evaluation of culture media like MacConkey agar, blood agar and cysteine lactose electrolyte deficient agar used routinely in microbiology laboratories in developing countries for isolation and identification of gram positive uropathogens and yeast.

Our findings correlate with the study done by Manjusree BS and Sharmin et al. [12,13] . In a study done by Manjushree BJ showed the same results. [12]

But out of 56 gram positive cocci, rate of growth on CLED agar was 52 while on MacConkey agar only 16 were grown and on blood agar only 38 were grown. By literature search, there are several studies which showed that gram positive cocci like Staphylococcus aureus and coagulase negative staphylococcus like *Staphylococcus saprophyticus* and *Staphylococcus epidermidis* and *Enterococcus* species are the common uropathogens now a day responsible for UTI.

Among Candida species, in current study all the 17 isolates are grown on CLED agar, but on MacConkey agar, isolation rate was 5 and on blood agar it was [9]. Our findings are similar with a study conducted by Ciragil et al and Manjusree BJ. [14,12]

In this study, almost all the pathogens responsible for UTI were isolated from CLED agar alone as compared to Mac-Conkey and blood agar together, which further cuts the cost as well as workload of the laboratory.

In a study done by Quiser S, they observed that the rate of isolation by using CLED media were like rate of isolation by using chromogenic media i.e. both media were found comparable as far as isolation of bacteria was concerned the difference was that identification was rapid by chromogenic media but the cost of chromogenic media is very high as compared to CLED agar. [8]

CONCLUSION

CLED agar can be used as media of choice for isolation of common uropathogens because it is user friendly, cost effective and also decreases work load of the laboratories. It is also helpful in decreasing the workload, user friendly and it is cost effective.

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Table 1: Shows comparison of three culture media for the rate of isolation of Gram positive cocci and yeast.

Name of the organism	Total number	CLED	MacConkey agar	Blood agar
Staphylococcus aureus	24	20	10	20
Staphylococcus saprophyticus	05	5	3	1
Staphylococcus epidermidis	02	2	0	2
Enterococcus species	25	25	03	15
Candida species	17	17	05	9
Total	73	69	21	47

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